



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of:

Confirmation No.: 2916

YOSHIDA et al.

Art Unit: 1755

Application No.: 09/696,013

Examiner: C. Koslow

Filed: October 26, 2000

Attorney Dkt. No.: 107400-00016

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NOV 20 2003
TC 1700

For: FERROMAGNETIC ZnO-TYPE COMPOUND INCLUDING TRANSITION
METALLIC ELEMENT AND METHOD FOR ADJUSTING FERROMAGNETIC
CHARACTERISTICS THEREOF

Submission of Declaration under 37 CFR 1.132

MAIL STOP AF
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Date: November 21, 2003

Sir:

With the attached Petition for Extension of Time for one month, applicants respectfully request that the attached Declaration be entered in order to make of record the factual basis for applicants' interpretation of a reference, Miyazaki et al (US 5,532,062), relied upon by the Final Office Action.


Remarks

The undersigned would like to thank Examiner Koslow for a courteous telephone interview conducted on October 22, 2003 in which the undersigned explained the need of filing the Declaration and Examiner Koslow indicated that she would read the Declaration if filed.

The Declaration shows that a doped ZnO compound prepared according to Miyazaki et al was not ferromagnetic. Because Miyazaki et al fails to disclose a doped ZnO compound having ferromagnetic characteristics, applicants submit that Miyazaki et al does not inherently disclose the adjustment of ferromagnetic characteristics of a ZnO compound. Applicants respectfully request that the Declaration be entered to allow the appeal to proceed.

In the event this paper is not timely filed, Applicants hereby petition for an appropriate extension of time. The fee for this extension may be charged to our Deposit Account No. 01-2300, referring to client-matter number 107400-00016, along with any other fees which may be required with respect to this application.

Respectfully submitted,



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Enclosures: Petition for Extension of Time
Declaration under 37 CFR 1.132
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CHARACTERISTICS THEREOF

Declaration under 37 CFR 1.132

MAIL STOP AF
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

I, Hiroshi Yoshida, hereby declare and state:

1. I have a Ph.D. degree in physics, which was conferred upon me by Osaka
University in Osaka, Japan in 1979.

2. I am a co-inventor of the present application and am knowledgeable of the art
to which the present invention pertains.

3. The following experiment was conducted by me or under my supervision.

4. A $\text{Zn}_{0.95}\text{Cr}_{0.05}\text{O}$ film was prepared using a procedure very similar to that of Example 2 of Miyazaki et al, US 5,532,062, column 10, lines 33-37. The Cr doped ZnO film was formed on a glass substrate by a direct current sputtering method in an atmosphere of $\text{Ar}:\text{O}_2 = 9:1$ at 1 to 10 Pa, employing a target of a ZnCrO containing 5.0 atomic % Cr and 95.0 atomic % Zn (see the attached diagram, entitled "Direct Current Sputtering Method"). Two more samples of $\text{Zn}_{0.95}\text{Cr}_{0.05}\text{O}$ film were also prepared with the same procedure. The samples of Cr doped ZnO film, i.e. $\text{Zn}_{0.95}\text{Cr}_{0.05}\text{O}$ film, prepared according to the disclosure of Miyazaki et al, had a polycrystalline structure, which contained impurities phase, and a high resistivity.

A $\text{Zn}_{0.95}\text{Cr}_{0.05}\text{O}$ film of the present invention was grown on a sapphire (Al_2O_3) substrate epitaxially by molecular beam epitaxy (MBE) using the MBE apparatus of Figure 1 of the application operated in an ultrahigh vacuum condition of approximately 1.33×10^{-6} Pa with a cell containing Zn and another cell containing Cr. The procedure formed a thin film having a single crystalline structure, in the form of a Wurtzite structure having atoms correctly arranged.

Magnetization was measured while a magnetic field was applied onto the three samples of the $\text{Zn}_{0.95}\text{Cr}_{0.05}\text{O}$ film of Miyazaki et al and the $\text{Zn}_{0.95}\text{Cr}_{0.05}\text{O}$ film of the present invention. The data are shown in the attached graph. The $\text{Zn}_{0.95}\text{Cr}_{0.05}\text{O}$ film of the present invention showed ferromagnetic hysteresis (see

the line depicted with solid dots in the attached graph). In contrast, the three samples of the $\text{Zn}_{0.95}\text{Cr}_{0.05}\text{O}$ film of Miyazaki et al showed no ferromagnetic hysteresis (see the lines depicted with crosses, open diamonds and open triangles in the attached graph).

The data show that, unlike the $\text{Zn}_{0.95}\text{Cr}_{0.05}\text{O}$ film of the present invention, the $\text{Zn}_{0.95}\text{Cr}_{0.05}\text{O}$ film of Miyazaki et al had no ferromagnetic characteristics.

5. A $\text{Zn}_{0.95}\text{Cr}_{0.05}\text{O}$ film of the present invention grown epitaxially with metal organic chemical vapor deposition is expected to have ferromagnetic characteristics.

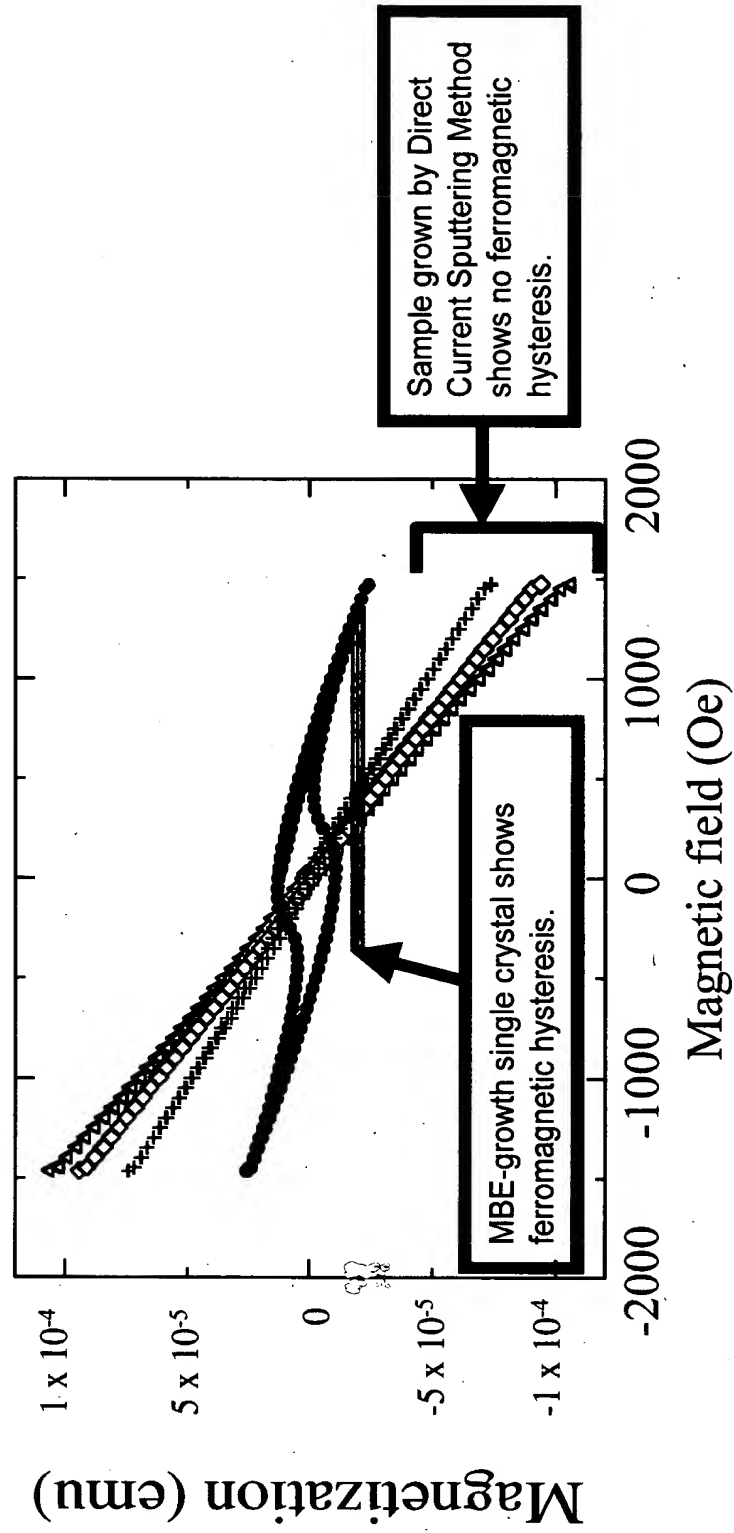
6. I hereby declare that all statements made herein of my own knowledge are true, and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine and/or imprisonment under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the above-identified patent application or any patent issuing therefrom.


Hiroshi Yoshida

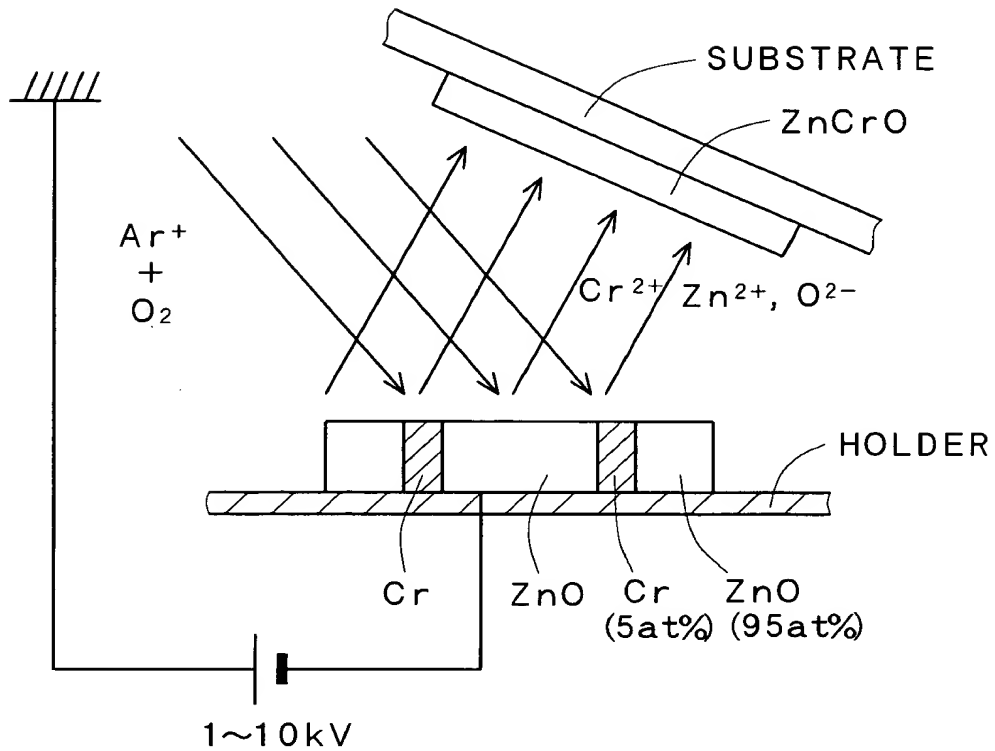
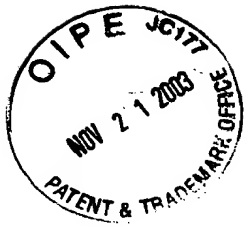

DATE DECLARATION SIGNED



$\text{Zn}_{0.95}\text{Cr}_{0.05}\text{O}$ Grown by MBE Growth Single Crystal vs. $\text{Zn}_{0.95}\text{Cr}_{0.05}\text{O}$ Grown by Direct Current Sputtering Method



Direct Current Sputtering Method



CONDITON

- vacuum level: 1~10 Pascal
- atmosphere: Ar gas + O₂ gas (10%)
- applied voltage: 1~10kV DC